```
**********************************************************************
*                                                                    *
*          QQQQQQQQ        ZZZZZZZZZZ      XX      XX              *
*         QQQQQQQQQQ       ZZZZZZZZ          XX    XX               *
*         QQ      QQ             ZZ          XX XX                  *
*         QQ      QQ            ZZ             XXX                  *
*         QQ      QQ           ZZ              XXX                  *
*         QQ    QQ QQ         ZZ               XX XX                *
*         QQQQQQQQQQ          ZZZZZZZZ         XX   XX              *
*          QQQQQQQQ           ZZZZZZZZZZ       XX     XX            *
*                QQ                                                  *
*                                                                    *
**********************************************************************
```

The Journal Covering Amateur Radio & Sinclair Computers
ZX-80; Micro-Ace; ZX81; T/S 1000, 1500, & 2068

2025 O'Donnell Drive
Las Cruces, New Mexico
88001

K5XY — Alex. F. Burr — Publisher

W4GHV/5 — Bo Barry — Editor

Volume 2 Number 10 ($1.50/issue) September 1984

* Large Letter 'Type' Program, W3ZQN-KA4FRF
* Oscar-10 Plot Program (TS-2068), W6WNK-WA6DLI
* Moon Locator Program, W5FF/K5FF-WA6DLI
* Half-wave Dipole Calculations, W2MS
* The Quantum Leap (Part IV), K5XY
* Publisher's Notes, K5XY
* Bits & Bytes
* QZX Friends
* EP-22 Printer Review, KA2LHO
* Unclassified Ads

COMING UP:
Type Prog (2068)
Yagi Design
QSL Maker (2068)
QSL Maker-revised
Morse Code Trainer
Meteor Shower Pred.
Loaded Vert. Ant.
Morse Trainer(2068)
Graphic Plotter
Coax-trap Ant.
Q-SAVE/Z-XLR8 info

Extend your ZX81/TS1000/TS1500: Add Memory that won't Forget!

▸*DESCRIBED IN* **Radio-Electronics** *JULY/AUGUST 1983*

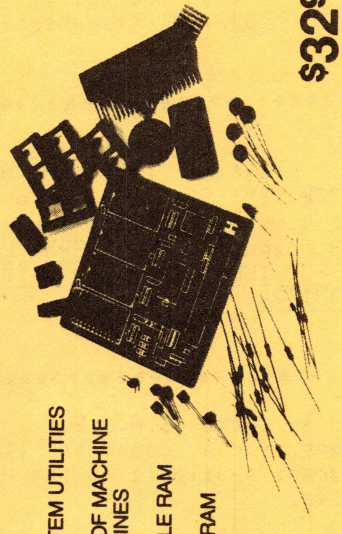
ADD YOUR OWN SYSTEM UTILITIES

BUILD UP A LIBRARY OF MACHINE LANGUAGE SUBROUTINES

UP TO 8K NONVOLATILE RAM

USE HM6116LP CMOS RAM OR 2716/2732 EPROM

COMPATIBLE WITH 16K RAM PACKS



$3295

plus $1.95 shipping and handling

READ THE REVIEWS:

What a super product!...conceived and executed very nicely...and with quality components. **(SYNTAX QUARTERLY Winter 82)**

8K Nonvolatile memory is a gem! It has so many possible uses...I recommend this board most heartily. **(OKLAHOMA S.U.G. Newsletter 1/3)**

We found the documentation to be far superior to that (of) most hardware we've received. **(S.U.N. Newsletter Nov/Dec 82)**

For versatility this is even better than an EPROM...ranks quite high on the list of "must-haves"... **(SYNC Magazine Mar/Apr 83)**

Provides the user with instant software...an extremely versatile memory extension... **(Z-WEST June 83)**

INTRODUCTION

This memory board is designed to fill the transparent 8K block of memory (from 8K to 16K) in a ZX81-16K system. This area of memory is an ideal place to store, either permanently or temporarily, machine language routines or data which are to be used by the BASIC system.

Sample utilities are included with the kit.

The use of HM6116LP 2K CMOS RAM memory IC's with their own reserve power supply means that routines stored in the RAM are nonvolatile — the RAM retains its memory even when the ZX81 is switched off or reset. Moreover, being RAM, the routines you store in the memory are easily modified. The lithium cell supplied with the board will maintain sufficient reserve power for almost ten years.

ASSEMBLY

Complete step-by-step instructions in a 20 page manual make assembly of the board easy. The kit (pictured above) is complete with a silkscreened solder-masked printed circuit board, all capacitors, resistors, transistors, sockets, connectors, integrated circuits, and the lithium cell. The board is supplied with one 2K CMOS 6116LP-3 RAM — it will accomodate three more for a total of 8K.

Complete kit with one 2K 6116LP-3	$32.95
Additional three 6116LP-3	$16.00 30.00
Bare pc board & manual	$13.05
Kit for EPROM use only	$22.95
Assembled & tested with 2K	$47.95
Assembled & tested with 8K	$65.95
Shipping & handling per order	$ 1.95

Send check or money order to the address below:

HUNTER, 1630 FOREST HILLS DRIVE, OKEMOS, MI 48864

"LARGE LETTER TYPE"

BY
THOMAS S. DUNLOP
KA4FRF

THIS PROGRAM IS BASICALLY "TYPE" BY BOB LEES. THERE ARE A FEW CHANGES THAT ACCOMMODATE THE SUBROUTINE THAT CREATES THE BIG LETTERS AND A FEW CHANGES TO THE EDITING PROCESS (THESE ARE FOUND AND EXPLAINED IN THE PROGRAM ITSELF). (USED "TYPE" SINCE IT IS VERY VERSATILE AND EASY TO WORK WITH.

SOME OF THE CHANGES WERE:
ALL PRINT POSITIONS (PREVIOUSLY "C" HAVE BEEN CHANGED TO "B"). SOME GRAPHICS CHARACTERS HAVE BEEN INCLUDED FOR LINES ON THE PAGE COPY.

LINE 405 WAS ADDED TO "PAD OUT" THE DISPLAY FILE, OTHERWISE WHEN YOU COPIED THE SCREEN YOU WOULD GET JUNK FROM THE LINES THAT DID NOT HAVE TEXT.

THE SUBROUTINE AT LINE 1100 GENERATES THE TWO CHARACTER SETS THAT FORM ONE LARGE LETTER (UPPER AND LOWER PORTION OF EACH CHARACTER). TO GET IT INTO UPPER MEMORY, RAMTOP MUST BE SET TO 30720.

BEGINNING AT LINE 9501 ARE THE OPERATING INSTRUCTIONS FOR THIS PROGRAM (ADDED FOR INFORMATION ONLY).

I ENJOY USING THIS PROGRAM AND LIKE THE BIG PRINT GENERATED BY THE "LITTLE" ZX-81. IT IS ONE OF MY FAVORITES.

(PROGRAM ON PAGE 3)

*** KA2LHO HAM HELPER SERIES ***
Kraig D. Pritts - KA2LHO
3421 Oneida St.
Chadwicks, NY 13319

NEW !!!

NOVICE EXAM KIT

FOR TIMEX/SINCLAIR COMPUTERS

This is a series of four programs which use all 200 FCC questions to randomly make up a written Novice exam. A different test is given each time! This is useful for practice sessions as well as giving exams to potential Novices. This kit is great for individual testing as it eliminates all paperwork---load a program and go! The package is complete with the four programs on a tape cassette and a 12 page documentation booklet. Also included is a listing of the "working portion" of the program so you can see how it works and make modifications if you desire.

This is the first program of its kind for the Timex/Sinclair computers so don't miss out on it!!!

COMPLETE PACKAGE
(tape, listing, documentation)
$25.00 (U.S.)
$27.00 (elsewhere)

NEW!!!
ALL programs in the KA2LHO HAM HELPER SERIES are now also available on cassette for the Timex/Sinclair 2068 computer AT THE SAME LOW PRICES AS FOR THE 1000 AND 1500 SERIES COMPUTERS .

Send a large S.A.S.E. with two stamps for a complete listing of programs available in the Ham Helper Series.

OSCAR-10 PLOT PROGRAM 2068 VERSION

SEE P6.4

```
  2 GO TO 200
  3 GO TO 30
  4 LET I=1
  5 DIM J$(40)
  6 INK 4: LET J$=" IDEA BY W6W
NK FOR AMSAT OSC-10"
  7 PRINT AT 13,0;J$
  9 FOR B=1 TO 6 STEP 32
 10 LET I=I+1
 12 LET J$(B TO B+31)=J$(B+1 TO
 B+31)+J$(B)
 15 IF I=33 THEN GO TO 6416
 18 NEXT B
 20 GO TO 7
 25 POKE 23658,8
 26 PAPER 1: BORDER 1: BRIGHT 0
 INK 7: CLS
 27 LET V=0
 30 CLS
 35
 40 PRINT "   MENU FOR VR-85 BY
 W6WNK:-"
 50 PRINT "
 60 PRINT
 65 PRINT
 70 PRINT " 1   OSCAR 10 WORLD
MAP"
 95 PRINT
 100 PRINT " 2   IMPORTANT INSTR
UCTIONS"
 110 PRINT
 120 PRINT " 3   CHANGE KEPLERIA
NS"
 125 PRINT
 130 PRINT " 4   WINDOWS TO DX C
ITIES"
 131 PRINT
 132 PRINT " 5   AZ/EL,RANGE,PHA
SE,ETC."
 133 PRINT
 134 PRINT " 6   SAVE TO TAPE"
 135 PRINT
 140 PRINT AT 17,5;"SELECT DESIR
ED MODE";AT 19,6;"TYPE INPUT NUM
BER"
 150 GO SUB 1240
 155 LET B$=INKEY$
 160 IF B$<"1" OR B$>"6" THEN GO
 TO 150
 170 GO TO (B$="1")*5070+(B$="2"
)*1550+(B$="3")*2000+(B$="4")*95
40+(B$="5")*9490+(B$="6")*9994
 180 GO TO 1250
 200 REM READ
 210 POKE 16390,4
 220 POKE 16451,8
 230 CLEAR
 240 DIM 0$(3900)
 250 RANDOMIZE USR 10243
 260 GO TO 25
1250 IF INKEY$<>"" THEN GO TO 12
50
1255 IF INKEY$="" THEN GO TO 125
5
1256 LET A=3
1265 RETURN
1550 CLS
1555 PRINT AT 0,9;"INSTRUCTIONS"
1556 PRINT
1557 PRINT "THE VR-85 HAS 4 PGM
SELECTIONS."
1558 PRINT
1560 PRINT "1-MAP- SAT MOVES IN
15 MIN STEPS. PRESS BREAK TO STO
P AND -C- TOCONT(ENTER ANY DATE
AND TIME UTC. IF SAT NOT IN VIEW
,EL WILL READ 0)"
1561 PRINT
1562 PRINT "2-LIST TO EDIT KEPLE
RIANS"
1563 PRINT
1565 PRINT "4-WINDOWS FOR DX CIT
IES COVERS 4HOURS FROM THE SELEC
TED TIME."
1566 PRINT
1567 PRINT "5-RANGE,GROUND PATH
DATA,USED ONOSCAR-10,DATA WILL S
CROLL UPWARD"
1568 PRINT
1569 PRINT "NOTE START ALL TIMES
 AT AN EVEN HOUR(EG 1100) AND US
E FOUR DIGITS AS(HHMM)"
1665 PRINT AT 20,5;"PRESS ENTER
TO RETURN"
1670 GO SUB 1250
1680 GO TO 30
2010 LIST 6515
2260 PRINT "   PRESS ENTER TO RE
TURN"
2270 GO SUB 1240
2280 GO TO 30
3010 CLS
3015 PRINT INK 4;"BE
CONT OR GOTO 25"
3016 PRINT INVERSE 1;AT 1,4;"0TH
 IS WEST COVINA"
3017 IF CA=2 THEN PRINT INVERSE
1;AT 1,4;"0TH IS AUCKLAND,NZ"
3018 IF CA=3 THEN PRINT INVERSE
1;AT 1,4;"0TH IS TOKYO, JAPAN"
3019 IF CA=4 THEN PRINT INVERSE
1;AT 1,4;"0TH IS LONDON, U.K."
3020 IF CA=5 THEN PRINT INVERSE
1;AT 1,4;"0TH IS NEW YORK, US"
3021 PRINT
3030 PRINT INK 3;"   "; IN
K 4;"   "; INK 6;"   "; IN
K 3;"
3040 PRINT INK 6;" "; INK 3;"
   "; INK 4;"   "; INK 2;"
   "; INK 6;"
3050 PRINT INK 3;"   "; INK 2;"
   "; INK 6;"
3060 PRINT INK 3;"   "; INK 2;"
   "; INK 6;"
3070 PRINT INK 2;"   "; INK 2;"
   "; INK 5;"   "; IN
K 6;"
3080 PRINT INK 2;"   "; INK 5;"
   "; INK 6;"
3090 PRINT INK 2;"   "; INK 5;"
   "; INK 3;"   "; INK
5;"   "; INK 6;"
3100 PRINT INK 6;"   "; INK 3;"
   "; INK 6;"
3110 PRINT INK 6;"   "; INK 3;"
   "; INK 6;"
3120 PRINT INK 6;"   "; INK 3;"
   "; INK 4;"
3130 PRINT INK 6;"   "; INK 3;"
   "; INK 2;" "; I
NK 4;"
3140 PRINT INK 6;"   "; INK 3;"
   "; INK 4;"
   "; INK 2;"
3150 PRINT INK 6;"   "; INK 2;"
3160 PRINT INK 6;"

3163 INK 7
3165 PRINT AT 17,0;"SAT:OSCAR-10
   DATE: ";INT MO;"/";INT DM;"/"
;INT YR;
3166 PRINT AT 18,0; INK 4;"
"
3170 PRINT AT 19,0;"UTC   ";TAB
6;"AZ   ";TAB 10;"EL";TAB 13;"RAN
GE";TAB 20;"LON";TAB 24;"LAT";TA
B 29;"PH5";
3175 PRINT AT 20,5; INK 4;"COMPU
TING SATELLITE COORD."
3176 PAUSE 60
3178 PRINT AT 20,5; INK 1;"COMPU
TING SATELLITE COORD."
3180 GO TO 7010
3510 IF W5<=180 THEN LET LO=W5/-
5.62+31
3520 IF W5>180 THEN LET LO=W5/-5
.62+95
3530 LET LA=L5/5+23
3545 LET I=1
3550 FOR S=1 TO 9999
3555 INK 7: BRIGHT 1: BEEP .03,5
0
3560 PLOT 4*LO,4*LA
3590 PLOT OVER 1;4*LO,4*LA
3595 LET I=I+1
3600 PLOT 4*LO,4*LA
3610 INK 4: BRIGHT 0
3620 IF I=17 THEN GO TO 3660
3625 NEXT S
3662 LET T=T+1/96
3664 LET TA=VAL T$
3665 IF TA=2345 THEN GO TO 9040
3666 GO TO 3010
5070 CLS
5080 LET A=3
5110 GO TO 6200
5120 LET DIF=ABS (W5-LO)
5130 IF DIF>180 THEN LET DIF=360
-DIF
5140 LET DZ1=((SIN (LA*PO))*(SIN
 (L5*PO))+(COS (LA*PO))*(COS (L5
*PO))*(COS (DIF*PO)))
5150 LET DZ1=57.3*(-ATN (DZ1/SQR
 (-DZ1*DZ1+1))+PI/2)
5160 IF DZ>DZ1 THEN PRINT TAB 30
; INK 2; BRIGHT 1; FLASH 1;"IN"
5165 BRIGHT 0
5170 IF DZ<DZ1 THEN PRINT TAB 30
;"--"
5180 RETURN
5200 LET LA=13.75
5265 LET LO=-100.52
5268 PRINT AT 3,19;"BANGKOK";
5270 GO SUB 5120
5271 LET LA=18.97
5274 LET LO=-72.83
5275 PRINT AT 4,19;"BOMBAY";
5280 GO SUB 5120
5290 LET LA=30.05
5300 LET LO=-31.25
5305 PRINT AT 5,19;"CAIRO";
5310 GO SUB 5120
5320 LET LA=-33.92
5330 LET LO=-18.37
5340 PRINT AT 6,19;"CAPE TOWN";
5350 GO SUB 5120
5360 LET LA=34.17
5370 LET LO=117.97
5410 PRINT AT 7,19;"W.COVINA,CA"
;
5420 GO SUB 5120
5430 LET LA=28.67
5440 LET LO=-77.22
5450 PRINT AT 8,19;"DELHI";
5460 GO SUB 5120
5470 LET LA=64.83
5480 LET LO=147.72
5490 PRINT AT 9,19;"FAIRBANKS";
5495 GO SUB 5120
5500 LET LA=22.28
5510 LET LO=-114.02
5520 PRINT AT 10,19;"HONG KONG";
5530 GO SUB 5120
5540 LET LA=21.32
5550 LET LO=157.87
5560 PRINT AT 11,19;"HONOLULU";
5565 GO SUB 5120
5570 LET LA=51.5
5580 LET LO=-.17
5590 PRINT AT 12,19;"LONDON";
5600 GO SUB 5120
5610 LET LA=40.72
5620 LET LO=74.02
5630 PRINT AT 13,19;"NEW YORK";
5640 GO SUB 5120
5650 LET LA=59.92
5660 LET LO=-10.75
5665 PRINT AT 14,19;"OSLO";
5667 GO SUB 5120
5670 LET LA=-17.55
5680 LET LO=149.6
5685 PRINT AT 15,19;"PAPEETE";
5710 GO SUB 5120
5720 LET LA=-31.93
5730 LET LO=-115.83
5740 PRINT AT 16,19;"PERTH";
5750 GO SUB 5120
5760 LET LA=-22.9
5800 LET LO=45.25
5810 PRINT AT 17,19;"RIO";
5820 GO SUB 5120
5830 LET LA=1.28
5840 LET LO=-103.85
5850 PRINT AT 18,19;"SINGAPORE";
5860 GO SUB 5120
5900 LET LA=-33.87
5910 LET LO=-151.22
5920 PRINT AT 19,19;"SYDNEY";
5930 GO SUB 5120
5940 LET LA=35.7
5950 LET LO=-139.77
5960 PRINT AT 20,19;"TOKYO";
5970 GO SUB 5120
5980 LET LA=-41.3
5990 LET LO=-174.77
6000 PRINT AT 21,19;"WELLINGTON"
;
6010 GO SUB 5120
6012 IF A=1 THEN PRINT INK 2; FL
ASH 1;AT 1,6;"HIT ANY KEY FOR ME
NU"
6015 PAUSE 4E4
6018 IF A=1 THEN GO TO 25
6020 RETURN
6030 LET D$=STR$ (T4)
6040 DIM E$(4)
6050 LET E$="0000"
6060 DIM T$(4)
6070 LET U=4-LEN D$
6080 LET T$=E$(1 TO U)+D$
6090 RETURN
6231 PRINT AT 1,4;"TYPE  DAY  OF
  MONTH: ";
6235 INPUT DM
6240 PRINT DM
6245 PRINT AT 2,4;"TYPE NUMBER O
F MONTH: ";
6250 INPUT MO
6255 PRINT MO
6260 PRINT AT 3,4;"TYPE YEAR (E.
G.; 84): ";
6265 INPUT YR
6270 PRINT YR
6271 PRINT AT 4,4;"UTC START AS(
1400):-";
6272 INPUT S$
6273 PRINT S$
6275 PRINT AT 6,1;"PICK 0TH DESI
RED:--"
6280 PRINT AT 7,4;"TYPE 1 HOME--
                   TYPE 2 FOR AU
CKLAND (ZL)        TYPE 3 FOR TO
KYO  (JA)          TYPE 4 FOR LO
NDON  (G)          TYPE 5 FOR NE
W YORK.....";
6281 INPUT CA
6282 PRINT CA
6290 PRINT INK 0;AT 15,3;"
"
6295 PRINT INK 0;TAB 3;" ";TAB 2
8;"
6300 PRINT INK 0;TAB 3;" ";TAB 2
8;"
6305 PRINT INK 0;TAB 3;" ";TAB 2
8;"
6310 PRINT INK 0;TAB 3;"
"
6315 PRINT INK 5;AT 16,4;"THIS 2
068 PROGRAM WAS"
6320 PRINT INK 5;AT 17,4;"TRANSL
ATED BY WA6DLI "
6325 PRINT INK 3; INVERSE 1;AT 1
8,7;"  PLEASE STANDBY "
6415 GO TO 4
6416 LET T1=VAL S$
6435
6440 LET D6=INT (YR/4)-INT ((YR-
1)/4)+212 +DM+(SGN (MO-8)*(INT (
.5+(ABS ((MO-8)*30.5))))
6450 IF MO<3 THEN LET D6=DM+(MO-
1)*31
6460 CLS
6515 REM START KEPLERIANS
6516 REM 6810 FOR NEW HOME LAT/L
NG
6518 REM NASA SET-108 7/12/84
6519 CLS
6520 LET Y2=84
6530 LET JD=195.94119483
6540 LET I0=25.6129
6550 LET RAAN=189.0754
6600 LET E0=0.6080442
6610 LET W0=288.4692
6620 LET MA=17.039
6630 LET MM=2.05846092
6640 LET G0=7.5369793E13
6650 LET G1=1.00273790093
6660 LET G2=.2759328721
6710 IF YR=84 THEN LET G2=.27460
66342
6720 IF YR=85 THEN LET G2=.27668
14244
6730 LET D6=D6+365*(YR-Y2)
6740 LET PI=3.14159265
6750 LET P2=2*PI
6760 LET P0=PI/180
6770 LET T2=(INT (T1/100))/24+D6
6780 LET T=T2
6790 IF CA=2 THEN GO TO 9120
6791 IF CA=3 THEN GO TO 9130
6792 IF CA=4 THEN GO TO 9135
6793 IF CA=5 THEN GO TO 9140
6800 LET L9=34.17
6810 LET W9=117.97
6820 LET H9=120
6830 LET R0=6378.16
6840 LET F=1/298.25
6850 IF MM>.1 THEN LET A0=((G0/(
MM*2))↑(1/3))
6860 IF MM<=.1 THEN LET MM=SQR (
G0/(A0↑3))
6900 LET E2=1-E0↑2
6910 LET E1=SQR (E2)
6920 LET FA=0
6930 LET Q0=MA/360
6937 IF A=3 THEN GO TO 3010
6940 PRINT ;TAB 3;"W6WNK  OSCAR-
10 ON ";MO;"/";DM;"/";YR,,,
6941 PRINT INVERSE 1;AT 0,0;"FRO
M W6 "
6942 IF CA=2 THEN PRINT INVERSE
1;AT 0,0;"FROM ZL "
6943 IF CA=3 THEN PRINT INVERSE
1;AT 0,0;"FROM JA "
6944 IF CA=4 THEN PRINT INVERSE
1;AT 0,0;"FROM G  "
6945 IF CA=5 THEN PRINT INVERSE
1;AT 0,0;"FROM W2 "
6946 IF A=2 THEN GO TO 6955
6950 PRINT INVERSE 1;AT 2,0;"UTC
   ";TAB 6;"AZ   ";TAB 10;"EL";TA
B 14;"PH5";
6951 IF A=1 THEN GO TO 7000
6955 PRINT "UTC   ";TAB 6;"AZ  "
;TAB 10;"EL";TAB 13;"RANGE";TAB
20;"LON";TAB 24;"LAT";TAB 28;"PH
S";
7010 LET K2=9.95*((R0/A0)↑3.5)/(
E2↑2)
7020 LET S1=SIN (I0*P0)
7030 LET C1=COS (I0*P0)
```

```
7040 LET O=RAAN-(T-JD)*K2*C1
7050 LET SO=SIN (O*PO)
7060 LET CO=COS (O*PO)
7100 LET W=WO+(T-JD)*K2*(2.5*(C1
↑2)-.5)
7110 LET S2=SIN (W*PO)
7120 LET C2=COS (W*PO)
7130 DIM C(3,2)
7140 LET C(1,1)=(C2*CO)-(S2*SO*C
1)
7150 LET C(1,2)=-(S2*CO)-(C2*SO*
C1)
7160 LET C(2,1)=(C2*SO)+(S2*CO*C
1)
7200 LET C(2,2)=-(S2*SO)+(C2*CO*
C1)
7210 LET C(3,1)=(S2*S1)
7220 LET C(3,2)=(C2*S1)
7230 LET Q=MM*(T-JD)+QO
7240 LET K=INT Q
7250 LET M9=INT ((Q-K)*256)
7260 LET M=(Q-K)*P2
7270 LET E=M+EO*SIN M+.5*(EO↑2)*
SIN (2*M)
7310 LET S3=SIN E
7320 LET C3=COS E
7330 LET R3=1-EO*C3
7340 LET M1=E-EO*S3
7350 LET M5=M1-M
7360 IF ABS (M5)<1E-6 THEN GO TO
 7410
7370 LET E=E-M5/R3
7400 GO TO 7310
7410 LET XO=AO*(C3-EO)
7420 LET YO=AO*E1*S3
7430 LET R=AO*R3
7440 LET X1=XO*C(1,1)+YO*C(1,2)
7450 LET Y1=XO*C(2,1)+YO*C(2,2)
7460 LET Z1=XO*C(3,1)+YO*C(3,2)
7650 LET G7=T*G1+G2
7670 LET G7=(G7-(INT G7))*P2
7680 LET S7=-SIN G7
7690 LET C7=COS G7
7700 LET X=(X1*C7)-(Y1*S7)
7740 LET Y=(X1*S7)+(Y1*C7)
7750 LET Z=Z1
7760 LET L8=L9*PO
7770 LET S9=SIN (L8)
7780 LET C9=COS (L8)
7790 LET S8=SIN (-W9*PO)
7800 LET C8=COS (W9*PO)
7840 LET R9=RO*(1-(F/2)+(F/2)*CO
S (2*L8))+M9/1000
7850 LET L8=ATN ((1-F)↑2*S9/C9)
7860 LET Z9=R9*SIN (L8)
7870 LET X9=R9*COS (L8)*C8
7880 LET Y9=R9*COS (L8)*S8
7890 LET X5=(X-X9)
7900 LET Y5=(Y-Y9)
7940 LET Z5=(Z-Z9)
7950 LET R5=SQR (X5*X5+Y5*Y5+Z5*
Z5)
7960 LET DZ=6378/R
7970 LET DZ=57.3*(-ATN (DZ/SQR (
-DZ*DZ+1))+PI/2)
7980 LET Z8=(X5*C8*C9)+(Y5*S8*C9
)+(Z5*S9)
7990 LET X8=-(X5*C8*S9)-(Y5*S8*S
9)+(Z5*C9)
8000 LET Y8=(Y5*C8)-(X5*S8)
8040 LET S5=Z8/R5
8050 LET C5=SQR (1-S5*S5)
8060 LET E9=(ATN (S5/C5))/PO
8062 IF E9<=-1 THEN LET E9=0
8080 LET A9=(ATN (Y8/X8))/PO
8090 LET B5=Z/R
8100 LET L5=(ATN (B5/(SQR (1-B5*
B5))))*57.3
8140 LET W5=(ATN (Y/X))*57.3
8150 IF X<0 THEN LET W5=180-W5
8160 IF X>0 AND Y<0 THEN LET W5=
-W5
8170 IF X>0 AND Y>0 THEN LET W5=
360-W5
8180 IF X=0 AND Y>=0 THEN LET W5
=270
8190 IF X=0 AND Y<0 THEN LET W5=
90
8200 IF X8<0 THEN LET A9=A9+180
8240 IF X8>0 AND Y8<0 THEN LET A
9=360+A9
8250 IF X8=0 AND Y8>=0 THEN LET
A9=90
8260 IF X8=0 AND Y8<0 THEN LET A
9=270
8270 LET T4=(INT ((T-INT T)*2400
+.5))/100
8280 LET T4=100*((T4-INT T4)*.6+
INT T4)
8290 GO SUB 6030
8292 IF A=2 THEN GO TO 9000
8295 IF A=3 THEN GO TO 9000
8300 IF FA=1 THEN GO TO 8460
8340 PRINT TAB 0;T$;TAB 6;INT A9
;TAB 10;INT E9;TAB 14;INT M9;
8350 LET T=T+1/96
8360 IF (T-T2)>.19 THEN GO TO 83
75
8370 GO TO 7040
8375 IF A=1 THEN GO TO 8380
8377 IF A=2 THEN GO TO 9000
8380 LET FA=1
8390 LET T=T2
8450 GO TO 7040
8460 PRINT INVERSE 1;AT 2,19;"CI
TY AT-";T$
8480 GO SUB 5250
8580 LET T=T+1/96
8590 IF (T-T2)>.19 THEN GO TO 83
80
8600 GO TO 7040
8680 IF A=3 THEN GO TO 9000
9000 PRINT ;TAB 0;T$;TAB 6;INT A
9;TAB 10;INT E9;TAB 13;INT R5;TA
B 20;INT W5;TAB 24;INT L5;TAB 29
;INT M9;
9001 LET V=V+1
9002 IF A=2 AND V/20=1 OR V/20=2
 OR V/20=3 OR V/20=4 OR V/20=5 T
HEN PAUSE 300: CLS
9003 IF A=2 AND V/20=1 OR V/20=2
 OR V/20=3 OR V/20=4 OR V/20=5 T
HEN PRINT INVERSE 1; INK 5;"UTC"
;TAB 6;"AZ";TAB 10;"EL";TAB 13;"
RANGE";TAB 20;"LON";TAB 24;"LAT"
;TAB 28;"PHS";
9004 IF A=3 THEN GO TO 9038
9005 LET T=T+1/96
9006 IF V/20=6 THEN GO TO 25
9010 IF (T-T2)>.18 THEN
9015 IF (T-T2)>.19 THEN
9030 IF A=2 THEN GO TO 7040
9038 IF INT M9>=236 OR  INT M9<=
40 THEN PRINT AT 16,15;  INK 2;"T
RANSPONDER OFF"
9039 GO TO 3185
9040 LET DM=DM+1
9050 IF MO=1 OR MO=3 OR MO=5 OR
MO=7 OR MO=8 OR MO=10 OR MO=12 T
HEN GO TO 9600
9051 IF MO=4 OR MO=6 OR MO=9 OR
MO=11 THEN GO TO 9650
9103 IF DM=1 THEN LET MO=MO+1
9105 GO TO 3010
9120 LET L9=-35
9121 LET W9=185
9125 GO TO 6815
9130 LET L9=35.48
9131 LET W9=-139.51
9132 GO TO 6815
9135 LET L9=53.0
9136 LET W9=-.17
9137 GO TO 6815
9140 LET L9=40.72
9141 LET W9=74.02
9142 GO TO 6815
9490 CLS
9491 LET A=2
9500 GO TO 6200
9540 CLS
9550 LET A=1
9560 GO TO 6200
9600 IF DM>=32 THEN LET DM=1
9601 IF DM=1 THEN LET MO=MO+1
9602 GO TO 9105
9650 IF DM>=31 THEN LET DM=1
9651 IF DM=1 THEN LET MO=MO+1
9652 GO TO 9105
9700 REM WRITE
9710 POKE 16390,4
9720 POKE 16451,6
9730 RANDOMIZE USR 10243
9740 GO TO 25
9994 CLS : PRINT AT 12,4;"IS YOU
R RECORDER READY? Y/N";  INPUT V$
9995 IF V$(1)<>"Y" THEN GO TO 25
9998 SAVE "OSC-10C" LINE 25
```

END-OSCAR-10 PROGRAM

LARGE LETTER 'TYPE' PROGRAM

```
  5 CLS
  6 LET L=0
 10 LET N=21
 20 LET B=0
 30 PRINT AT N,B;"▒"
 40 SLOW
 50 IF INKEY$<>"" THEN GOTO 50
 60 IF INKEY$="" THEN GOTO 60
 70 FAST
 80 PRINT AT N,B;INKEY$;
 90 IF INKEY$=CHR$ 118 THEN GOT
O 300
100 IF INKEY$=CHR$ 112 THEN GOT
O 400
105 IF INKEY$=CHR$ 121 THEN PRI
NT AT N,B;CHR$ 3
110 IF INKEY$=CHR$ 119 THEN GOT
O 500
120 IF INKEY$=CHR$ 117 AND B=0
THEN GOTO 600
125 IF INKEY$=CHR$ 116 THEN PRI
NT AT N,B;CHR$ 131
130 LET B=B+1
140 IF B=32 THEN GOTO 410
150 IF B<27 THEN PRINT AT N,B;"
▒"
160 IF B=27 THEN PRINT AT N,B;"
5"
170 IF B=28 THEN PRINT AT N,B;"
4"
180 IF B=29 THEN PRINT AT N,B;"
3"
190 IF B=30 THEN PRINT AT N,B;"
2"
200 IF B=31 THEN PRINT AT N,B;"
1"
210 GOTO 40
300 PRINT AT N,B;" "
320 GOTO 130
400 PRINT AT N,B;" "
405 IF B<32 THEN PRINT AT N,31;
CHR$ 0
410 LET L=L+1
420 IF L=22 THEN GOTO 700
430 IF N<>21 THEN GOTO 10
440 SCROLL
450 GOTO 20
500 PRINT AT N,B;" "
510 IF B=0 THEN GOTO 530
520 LET B=B-1
530 GOTO 30
600 INPUT EL
610 LET N=21-EL
620 LET L=L-1
625 INPUT B
630 GOTO 30
700 SLOW
710 IF INKEY$<>"" THEN GOTO 710
720 IF INKEY$="" THEN GOTO 720
730 FAST
740 IF INKEY$=CHR$ 117 THEN GOT
O 900
750 IF INKEY$=CHR$ 14 THEN GOTO
770
755 IF INKEY$=CHR$ 25 THEN GOTO
1000
760 GOTO 700
770 GOSUB 9010
780 PRINT AT 21,0;"-----"
790 SCROLL
800 GOTO 5
900 INPUT EM
910 LET N=22-EM
920 LET L=L-1
925 INPUT B
930 GOTO 30
10000 COPY
1010 GOTO 780
```

Does this mean if I've got 32K o… of RAM, I still can't have more than 15K or so of instructions?

No. Many people think you are restricted but there is a neat trick where you can force your display file to leap the 32K mark in one bound by putting in a large, dummy instruction. The important thing is to make sure that the display file never straddles the 32K mark. Here is how:

a) On input, check from time to time the value in the VARS system variable, as this lies just above the end of the display file. PRINT PEEK 16401 * 256 + PEEK 16400

b) When the values of VARS approaches 32767, enter a huge line into the program, like: LET ZERO = 0 + 0 + 0 etc. with about 100 repetitions of (+0). This will push the d'play file entirely above 32768.

c) Check the system variable D-FILE to make sure the display file now begins above 32768: PRINT PEEK 16397 * 256 + PEEK 16396
If it is, then you can carry on programming.

(FROM 16K MEMOTECH INSTRUCT.)

```
1100 PRINT AT 12,0;"PLEASE WAIT
WHILE CHARACTER SET","IS BEING G
ENERATED, THANKS."
1105 PAUSE 200
1110 DIM E$(32)
1111 LET M=PEEK 16389*256
1113 FOR X=0 TO 63
1114 FOR C=0 TO 3
1115 POKE 2*C+X*8+M,PEEK (7680+X
*8+C)
1116 POKE 1+2*C+X*8+M,PEEK (7680
+X*8+C)
1117 POKE 512+2*C+X*8+M,PEEK (76
80+X*8+C+4)
1118 POKE 513+C*2+X*8+M,PEEK (76
80+X*8+C+4)
1119 NEXT C
1120 NEXT X
1121 FOR I=0 TO 112
1122 POKE 31744+I,PEEK (2161+I)
1123 NEXT I
1124 POKE 31857,201
1125 SLOW
9005 GOTO 9500
9010 FAST
9020 LET UF=PEEK 16396+PEEK 1639
7*256
9030 FOR U=0 TO 21
9040 FOR O=1 TO 32
9050 POKE 16443+O,PEEK (UF+U*33+
O)
9060 NEXT O
9070 POKE 31800,PEEK 16389/2
9080 LET UZ=USR 31744
9090 POKE 31800,PEEK 31800+1
9100 LET UZ=USR 31744
9110 NEXT U
9120 RETURN
9311 SAVE "TYPE"
9315 FAST
9320 RUN 1100
9500 CLS

9501 PRINT TAB 10;"BIG ""TYPE"""
9502 PRINT TAB 10;"▒▒▒▒▒▒▒▒▒▒▒▒"
9503 PRINT AT 3,0;"ENTER TEXT FR
OM KEYBOARD USING  THE ""ENTER""
 KEY FOR SPACING. THE""SPACE"" K
EY WILL BREAK THE."
9510 PRINT "PROGRAM AND YOU WILL
 HAVE TO","RESTART, LOOSING ALL
THAT WAS","PREVIOUSLY ENTERED."
9515 PRINT "NO GRAPHICS CHARACTE
RS CAN BE","ENTERED EXCEPT AS NO
TED IN THE","""SPECIAL FUNCTIONS
"" BELOW"
9520 PRINT ,,"SPECIAL FUNCTIONS:
","A▒""""SHIFT"" FUNCTION WILL PRINT
 ""▒""""SHIFT"" GRAPHICS WILL
 PRINT ""▒""""SHIFT"" 7 WILL
ADVANCE UP ONE  LINE"
9540 PRINT AT 20,0;"PRESS ""ENTE
R"" TO CONTINUE"
9550 DIM A$(1)
9560 INPUT A$
9570 IF A$=" " THEN GOTO 9590
9580 IF A$<>"" THEN GOTO 9590
9590 CLS
9600 PRINT ,,"EDITING:","","ONCE
 20 LINES HAVE BEEN ENTERED,THE
 ""▒"" CURSOR WILL DISSAPPEAR. TO
 EDIT TEXT PRESS ""SHIFT"" EDIT
AND THE ""▒"" CURSOR WILL APPEAR
."
9610 PRINT ,,"COUNTING FROM THE
BOTTOM OF THE SCREEN (LINE 1), E
NTER THE LINE NUMBER YOU WISH TO
 EDIT."
9620 PRINT ,,"COUNTING FROM LEFT
 TO RIGHT,","(POSITION 0 TO 31),
 ENTER THE  CHARACTER POSITION
YOU WISH TO  BEGIN EDITING AT."
9630 PRINT ,,"REPEAT THE EDITING
 AS NEEDED TO CORRECT ANY OTHER
ERRORS."
9640 PRINT AT 20,0;"PRESS ""ENTE
R"" TO CONTINUE"
9650 INPUT A$
9660 IF A$=" " THEN GOTO 9690
9670 IF A$<>" " THEN GOTO 9690
9690 CLS
9700 PRINT AT 5,0;"TO COPY:","
 ""TURN ON THE PRINTER AND PRESS
 ""SHIFT"" Z FOR LARGE LETTERS",
 ""SHIFT"" X FOR NORMAL LETTERS:
,,,"ONCE COPYING IS COMPLETED, T
HE","ENTIRE PAGE WILL SCROLL UP
ONE","LINE AND ""------"" WILL AP
PEAR AT THE BOTTOM LEFT CORNER R
EPLACINGTHE FIRST 5 CHARACTERS O
F THE  LAST LINE COPIED."
9710 PRINT , "TO BEGIN, PRESS ""
ENTER"""
9720 INPUT A$
9730 IF A$=" " THEN GOTO 1
9740 IF A$<>" " THEN GOTO 1
```

Oscar-10 Plot Program
Victor Ruebhausen, W6WNK - revised for the TS-2068 by WA6DLI

This neat OSCAR-10 plot shows a world map and the satellite with coordinates, or cities within range, or 15 minute updates for 24 hours. This conversion is printed with permission of W6WNK, who will provide TS-1000 or TS-2068 versions on tape for $15, which he donates to AMSAT! His address is 317 Opal Canyon Road, Duarte, Calif., 91010

To modify this listing for the TS-1000, delete lines 2, 25, 26, 3015 (INK4;), 3016-20 (inverse 1;), 3030-3160 (all ink#;), 3163 (INK7;),3166 (INK4;), 3175-3178, 6012 (INK2;flash;), 6290-end (INK#;), 9998 (line 25), add 9999 goto 25. (Ed. note: Bob, WA6DLI, sent a color photo of the screen, its spectacular & I wish it would reprint OK.)

Moon Tracking and Readout Program
Fred & Lee Fish, W5FF & K5FF - adapted for the ZX-81/TS-1000 by WA6DLI

This article appeared in July 1984 CQ Magazine and was written for the TRS-80 Model III. It plots the position of the moon for EME contacts (or perhaps, vampires..Ed.). This program, revised by Bob was printed 'without permission' of CQ or the authors, so I recommend you them for reprints of the original CQ article.

```
  1 REM EURND FAST AT 5  T GOSUB PI FAST AT TAN
 10 PRINT "**********************************"
 20 PRINT "MOON LOCATOR PROGRAM W5FF/K5FF"
 25 PRINT "**********************************"
 30 PRINT "TRANSLATED BY WA6DLI FM CQ 7/84"
 35 PRINT ,,,,"THIS PROGRAM OUTPUTS:","UTC, AZ, EL, GHA, DEC, AND RA"
 40 LET V=0
 45 LET TUPI=6.283185
 50 LET DEG=57.29578
 55 LET RAD=.01745329
 60 PRINT ,,"WHAT IS YOUR STATION CALL?"
 65 INPUT C$
 68 CLS
 70 PRINT ,,"ENTER YOUR LATITUDE","DEGREES:?"
 75 INPUT DD
 80 PRINT "MINUTES?"
 85 INPUT MM
 90 PRINT "SECONDS?"
 95 INPUT SS
100 PRINT "IS CALL ";C$;" AND LAT. ";DD;"/";MM;"/";SS,"ALL OK? Y/N"
110 INPUT Y$
120 IF Y$(1)="N" THEN GOTO 68
125 LET LAT=RAD*(DD+(MM+SS/60)/60)
130 PRINT "WHAT IS YOUR LONGITUDE?","DEGREES"
135 INPUT DD
140 PRINT "MINUTES?"
145 INPUT MM
150 PRINT "SECONDS?"
155 INPUT SS
160 PRINT ,,"IS LONGITUDE OF:";DD;"/";MM;"/";SS," ALL OK? Y/N?"
165 INPUT Y$
170 IF Y$(1)="N" THEN GOTO 130
175 LET LO=RAD*(DD+(MM+SS/60)/60)
177 PRINT ,,"ENTER START GHA OF YOUR ""WINDOW"""
178 PRINT "(USE YOUR LONG.-90 DEG."," IF GHA UNKNOWN)"
180 INPUT SG
185 PRINT SG
187 PRINT ,"OK?"
188 INPUT Y$
190 IF Y$(1)="N" THEN GOTO 177
191 CLS
192 LET SG=SG*RAD
193 PRINT "(USE YOUR LONG.+90 DEG.","IF END GHA UNKNOWN)"
194 PRINT "ENTER ENDING GHA"
195 INPUT EG
198 PRINT EG
200 PRINT ,"OK ? Y/N"
202 INPUT Y$(1)
205 IF Y$(1)="N" THEN GOTO 194
210 LET EG=EG*RAD
211 CLS
212 PRINT "WHAT INTERVAL DO YOU WANT"," REPORTED IN MINUTES?"
215 INPUT I
218 PRINT I
220 PRINT "WHAT IS DATE:MMDDYYYY?"
221 PRINT "MONTH?"
222 INPUT M
223 PRINT "DAY?"
224 INPUT D
225 PRINT "YEAR?"
226 INPUT Y
228 PRINT ,,"IS ";M;"/";D;"/";Y;" OK? Y/N"
230 INPUT Y$(1)
235 IF Y$(1)="N" THEN GOTO 220
240 GOSUB 1040
245 LET BJ=J
246 LET AM=M
247 LET AD=D
248 LET AY=Y
250 PRINT "INPUT ENDING DATE ","(MONTH,DAY,YEAR):MONTH? MM"
251 INPUT M
252 PRINT "DAY? DD"
253 INPUT D
254 PRINT "YEAR? YYYY"
255 INPUT Y
257 PRINT "IS ";M;"/";D;"/";Y;" ALL OK?"
258 INPUT Y$(1)
259 IF Y$(1)="N" THEN GOTO 250
260 GOSUB 1040
265 LET EJ=J
266 LET DA=BJ
267 LET D=AD
268 LET M=AM
269 LET Y=AY
280 LET UTC=0
282 CLS
285 PRINT ,,"MOON DATA FOR ";C$;":";M;"/";D;"/";Y
286 LPRINT ,,"MOON DATA FOR ";C$;":";M;"/";D;"/";Y
290 PRINT ,," UTC";TAB 5;"AZ";TAB 12;"ELV";TAB 18;"GHA";TAB 24;"DEC";TAB 30;"RA
"
291 LPRINT ,," UTC";TAB 5;"AZ";TAB 12;"ELV";TAB 18;"GHA";TAB 24;"DEC";TAB 30;"R
A"
```

```
300 LET B$=" "
305 PRINT "UTC";TAB 5;"AZ";TAB 12;B$;TAB 16;B$;TAB 23;B$;TAB 28;B$
310 LPRINT "UTC";TAB 5;"AZ";TAB 10;B$;TAB 15;B$;TAB 20;B$;TAB 25;B$
320 LET T1=DA+17472.5
322 GOTO 335
324 CLS
325 PRINT "UTC";TAB 5;"AZ";TAB 12;"ELV";TAB 18;"GHA";TAB 24;"DEC";TAB 30;"RA"

326 PRINT B$;TAB 5;B$;TAB 12;B$;TAB 16;B$;TAB 23;B$;TAB 28;B$
327 GOTO 335
330 REM CALC LOOP
331 IF V=15 OR V=30 OR V=45 OR V=60 OR V=75 OR V=90 OR V=105 THEN GOTO 324
335 LET DF=(UTC-INT (UTC/100)*100)+INT (UTC/100)*60)-1440
336 FAST
350 IF DF<0 THEN GOTO 390
360 IF DF>3 THEN GOTO 1100
370 LET UTC=2400
376 REM CALC LAT LONG MOON
380 LET T2=(UTC-INT (UTC/100)*100)/1440+INT (UTC/100)/24
400 LET T=T1+T2
405 LET X=(.751213+.036601102*T)
410 LET K1=(X-INT (X))*TUPI
415 LET X=(.822513+.0362916457*T)
420 LET K2=(X-INT (X))*TUPI
425 LET X=(.995766+.00273777852*T)
430 LET K3=(X-INT (X))*TUPI
435 LET X=(.974271+.0338631922*T)
440 LET K4=(X-INT (X))*TUPI
445 LET X=(.0312525+.0367481957*T)
450 LET K5=(X-INT (X))*TUPI
460 LET L1=K1+RAD*(.658*SIN (2*K4)+6.289*SIN (K2))
470 LET L1=L1+RAD*(-1.274*SIN (K2-2*K4)-.186*SIN (K3))
480 LET L1=L1+RAD*(.214*SIN (2*K2)-.114*SIN (2*K5))
490 LET L1=L1+RAD*(-.059*SIN (2*K2-2*K4)-.057*SIN (K2+K3-2*K4))
500 LET K6=K5+RAD*(.6593*SIN (2*K4)+6.2303*SIN (K2)-1.272*SIN (K2-2*K4))
510 LET L2=RAD*(5.144*SIN (K6)-.146*SIN (K5-2*K4))
520 REM CALC RA=R1
530 LET D1=COS (L2)*SIN (L1)*.397821+SIN (L2)*.917463
540 LET D1=ATN (D1/(SQR (1-D1*D1)))
550 LET A1=(COS (L2)*SIN (L1)*.917463-SIN (L2)*.397821)/COS (D1)
560 LET A2=COS (L2)*COS (L1)/COS (D1)
570 GOSUB 990
580 LET R1=FT
590 REM CALC LOC SIDERAL TIME
600 LET LST=.065709822*T1
610 LET LST=T2*24+1.002738+6.646055+(LST-INT (LST/24)*24)
620 LET LST=(LST-INT (LST/24)*24)
630 REM CALC GHA
640 LET GHA=((LST/24)*TUPI)-R1
650 IF GHA<0 THEN LET GHA=GHA+TUPI
651 IF GHA<0 THEN GOTO 670
660 IF GHA>TUPI THEN LET GHA=GHA-TUPI
670 IF SG=EG THEN GOTO 700
680 IF GHA<SG OR GHA>EG THEN GOTO 780
690 IF GHA<SG AND GHA>EG THEN LET UTC=UTC+I+(365*(SG-GHA))
691 IF GHA<SG AND GHA>EG THEN GOTO 730
700 IF GHA<SG AND GHA>EG THEN GOTO 780
710 IF GHA<=SG THEN LET UTC=UTC+I+(365*(SG-GHA))
711 IF GHA<=SG THEN GOTO 730
720 LET UTC=UTC+I+(365*(TUPI-GHA+SG))
730 LET UTC=INT (UTC/10)*10
735 IF UTC>2400 THEN GOTO 1100
740 LET Z=(UTC-INT (UTC/100)*100)-60
750 IF Z<0 THEN GOTO 330
760 LET UTC=INT (UTC/100)*100+100+Z
770 GOTO 330
780 REM CALC ELV
790 LET H=LO-GHA
800 LET D1=SIN (LAT)*SIN (D1)+COS (LAT)*COS (D1)*COS (H)
810 LET E2=SQR (1-(E1*E1))
820 LET EL=ATN ((E1/E2)-(1/(61.33*E2)))
830 LET F=ATN (E1/E2)
840 IF EL<0 OR EL>1.745329 THEN GOTO 930
850 REM CALC AZ
860 LET A1=SIN (LAT)*SIN (D1)+COS (LAT)*COS (D1)*COS (H)
870 LET A1=SIN (H)*COS (D1)/SQR (1-A1*A1)
880 LET A2=SIN (D1)/(COS (LAT)*COS (F))-(TAN (LAT)*TAN (F))
890 GOSUB 990
895 SLOW
900 PRINT UTC;TAB 5;(INT (FT*DEG*10))/10;TAB 11;(INT (EL*DEG*10))/10;TAB 16;(IN
T (GHA*DEG*100))/100;TAB 23;(INT (D1*DEG*10))/10;TAB 29;(INT (10*(R1*DEG/15)))/1
0
910 LPRINT UTC;TAB 5;(INT (FT*DEG*10))/10;TAB 11;(INT (EL*DEG*10))/10;TAB 16;(I
NT (GHA*DEG*100))/100;TAB 23;(INT (D1*DEG*10))/10;TAB 29;(INT (10*(R1*DEG/15)))/
10
920 LET V=V+1
930 LET UTC=UTC+I
931 IF UTC>2400 THEN GOTO 1100
940 LET Z=(UTC-INT (UTC/100)*100)-60
950 IF Z<0 THEN GOTO 330
960 LET UTC=INT (UTC/100)*100+100+Z
970 GOTO 330
980 REM ARCTAN ROUTINE
990 IF A2>0 AND A1>=0 THEN LET FT=ATN (A1/A2)
991 IF A2>0 AND A1<0 THEN GOTO 1020
1000 IF A2<0 THEN LET FT=ATN (A1/A2)+PI
1001 IF A2<0 THEN GOTO 1020
1010 LET FT=ATN (A1/A2)+TUPI
1020 RETURN
1030 REM THIS CALC DAYS SINCE 1852
1040 IF M>=3 THEN GOTO 1070
1050 LET J=365*(Y-1853)+D+30*(M+9)+INT ((M+10)/2)+INT ((Y-1853)/4)
1060 GOTO 1090
1070 IF M=9 OR M=11 THEN LET C=1
1071 IF M=1 OR M=2 OR M=3 OR M=4 OR M=5 OR M=6 OR M=7 OR M=8 OR M=10 OR M=12 THE
N LET C=0
1080 LET J=365*(Y-1852)+D+30*(M-3)+INT ((M-2)/2)+INT ((Y-1852)/4)+C-1
1090 RETURN
1100 GOSUB 1140
1110 LET DA=(INT (DA*10+.5)/10)+1
1120 IF DA>EJ THEN STOP
1121 IF DA<=EJ THEN GOTO 280
1130 REM ICREM.MO DAY YR
1140 IF D<28 THEN GOTO 1260
1150 IF M<2 THEN GOTO 1180
1160 IF Y<>4*INT (Y/4) THEN GOTO 1230
1170 IF D<29 THEN GOTO 1260
1171 IF D=29 THEN GOTO 1230
1180 IF D<30 THEN GOTO 1260
1181 IF D<30 THEN GOTO 1200
1190 IF M=4 OR M=6 OR M=9 OR M=11 THEN GOTO 1230
1192 IF M=1 OR M=2 OR M=5 OR M=7 OR M=8 OR M=10 OR M=12 THEN GOTO 1260
1200 IF M<12 THEN GOTO 1230
1210 LET Y=INT (((Y+1)*100+.5)/100)
1215 PRINT Y
1220 LET M=0
1230 LET D=1
1240 LET M=M+1
1260 LET D=D+1
1270 RETURN
1280 SAVE "MOONPLOT"
```

Half-Wave Dipole Calculations
Tom Winternitz, W2MS

This program gives the resistance, reactance, and SWR of a half-wave dipole at any other frequency. It is valid for thin wire dipoles in free space. In real use it will not be helpful if proximity to the earth is a factor, but it should prove to be instructive in any case.

```
   1 REM IMPEDANCE OF A THIN    DIPOLE ANTENNA AND SWR ON ITS   FEEDER  AS FUNCT
ION  OF         FREQUENCY. BY  W2MS - TOM WINTERNITZ, B0X 73, MERRY POINT, VA.,
22513
   2 REM TO COVER ANOTHER       FREQUENCY RANGE WITH THE SAME   ANTENNA, GO TO 3
200, - DONE BY  PRESSING CONT. AND ENTER AFTER  PRINTOUT STOP AT STATEMENT 3115.
   3 REM EXCEPT NEAR FULL WAVE AND TWO WAVE RESONANCE, RESISTANCE AND REACTANCE
ARE GIVEN BY 4 AND 5 BELOW.
   4 REM RESISTANCE=30*((1-(COT(BL/2))**2) *CIN(2BL) + 4*((COT(BL/2))**2) *CIN(BL)
 + 2COT(BL/2) * (SI(2BL)-2SI(BL)))
   5 REM REACTANCE = -120 * LN (2L/D) * COT(BL)
   6 REM NEAR FULL AND TWO WAVE RESONANCES R AND X ARE LIMITED TO A CIRCLE IN TH
E R/X PLANE PASSING THROUGH THE ORIGIN AND A POINT (RMAX) ON THE R AXIS. RMAX= (
RN**2)/R1 WHERE R1=67 FOR THE FIRST AND R1=95 FOR THE SECOND FULL WAVE RESONANCE
. RN=150*LOG(L/D).
   7 REM SEE KRAUS -ANTENNAS PAGE 276, SECT.10-11
  10 GOTO 3000
  12 REM 15 TO 22 SETS UP TO EVALUATE SINE INTEGRAL WITH SUBROUTINE 100

  15 IF X<3 THEN LET M=10
  16 IF X>=3 AND X<6 THEN LET M=20
  17 IF X>=6 THEN LET M=30
  19 LET B=1
  20 LET D=-1
  21 IF X>=11.5 THEN LET T=PI/2-COS X/X
  22 IF X>=11.5 THEN GOTO 25
  23 GOSUB 100
  25 LET SI=T
  65 RETURN
  70 REM 71 TO 78 SETS UP TO EVALUATE COSINE INTEGRAL WITH SUBROUTINE 100
  71 IF X<3 THEN LET M=10
  72 IF X>=3 AND X<6 THEN LET M=20
  73 IF X>=6 THEN LET M=30
  75 LET B=2
  76 LET D=1
  77 IF X>=11.5 THEN LET T=SIN X/X-.5***-LN X
  78 IF X>=11.5 THEN GOTO 80
  79 GOSUB 100
  80 LET CIN=-T
  81 RETURN
 100 REM SUBROUTINE EVALUATES AND SUMS M/2 TERMS OF SERIES EXPANSION OF SI OR CI
  SEE KRAUS-ANTENNAS- P.535.
 110 LET C=0
 115 LET T=0
 120 FOR N=B TO M STEP 2
 125 LET NF=1
 130 FOR R=1 TO N
 135 LET NF=NF*R
 140 NEXT R
 145 LET C=C+1
 150 LET S=D
 155 FOR I=1 TO C
 160 LET S=S*-1
 165 NEXT I
 170 LET T=T+S*X**N/(N*NF)
 175 NEXT N
 176 RETURN
2000 FOR F=F1 TO F2 STEP SF
2001 LET L=.5000*F/FR
2006 FOR N=1 TO 10
2007 IF INT ((L+.0001)*1000)/1000=N THEN GOTO 2290
2009 NEXT N
2010 LET BL=2*PI*L
2020 LET X=2*BL
2030 GOSUB 15
2040 LET S2=SI
2050 GOSUB 71
2060 LET C2=CIN
2070 LET X=BL
2080 GOSUB 15
2090 LET S1=SI
2100 GOSUB 71
2110 LET C1=CIN
2120 LET CT=(1/((TAN (BL/2))*(TAN (BL/2))))
2122 REM 2125/26 EVALUATES REACTANCE OF THIN ANTENNA. SEE KRAUS P.248 EQN.(9-36)
  2130 EVALUATES RESISTANCE. SEE KRAUS P. 262 EQN. (10-62)
2125 LET RCT=1/TAN (BL/2)
2126 LET XCL=-60*OM*RCT
2130 LET R=30*((1-CT)*C2+4*CT*C1+2*RCT*(S2-2*S1))
2139 IF F<=FR THEN GOTO 2170
2140 LET RN=150*.43429448*LN (LFR*12/DI)
2141 IF F>FR AND F<=3*FR THEN LET R2=RN*RN/67
2142 IF F>3*FR THEN LET R2=RN*RN/95
2144 LET AL=ABS ATN (XCL/ABS (.5*R2-R))
2146 IF R<=R2/2 AND XCL>=0 THEN LET AR=AL
2148 IF R>R2/2 AND XCL>=0 THEN LET AR=PI-AL
2150 IF R>R2/2 AND XCL<0 THEN LET AR=PI+AL
2152 IF R<=R2/2 AND XCL<0 THEN LET AR=2*PI-AL
2154 LET AH=XCL/SIN AR
2155 IF ABS AH>=R2/2 THEN LET XCL=R2/2*SIN AR
2160 IF ABS AH>=R2/2 THEN LET R=R2/2*(1-COS AR)
2170 LET ZL2=R*R+XCL*XCL
2172 LET ZL=SQR ZL2
2174 LET RHO=(ZL-Z0)/(ZL+Z0)
2176 LET SWR=(1+ABS RHO)/(1-ABS RHO)
2200 PRINT F;TAB 7;INT (XCL*100)/100;INT (100*R)/100;TAB 25;INT (SWR*10)/10

2290 NEXT F
2300 RETURN
2995 STOP
2999 REM START DATA INPUT.
3000 PRINT AT 1,0;"GIVEN A WIRE DIPOLE RESONANT AT "
3002 PRINT AT 2,12;"[?]     MHZ"
3004 INPUT FR
3006 PRINT AT 2,12;FR
3008 PRINT AT 3,0;"MADE OF NR. [?] WIRE. (8 TO 24)  - (EVEN NUMBER GAUGES ONLY)"
3010 INPUT WG
3012 PRINT AT 3,12;WG
3014 PRINT AT 4,0;"TO FIND ITS IMPEDANCE AND THE      SWR OF A [?]  OHM FEEDER"

3016 INPUT Z0
3018 PRINT AT 5,12;Z0
3020 PRINT AT 6,0;"FROM FREQ. [?]   MHZ TO [?]   MHZIN STEPS OF [?]   MHZ."

3022 INPUT F1
3024 PRINT AT 6,12;F1
3026 INPUT F2
3028 PRINT AT 6,24;F2
3030 INPUT SF
3032 PRINT AT 7,12;SF
3034 PAUSE 100
3040 REM 3045 TO 3061 CONVERT WIRE GAGUE TO DIAMETER (INCHES)
3045 LET D$=".1285.1019.0808.0641.0508.0403.0320.0253.0201"
3046 LET KT=0
3047 LET DI=0
3050 FOR N=8 TO 24 STEP 2
3052 LET KT=KT+5
3055 IF WG=N THEN LET DI=VAL D$(KT-4 TO KT)
3057 NEXT N
3059 IF DI<.0201 OR DI>.1285 THEN PRINT "ENTER WIRE GAGUE AGAIN"
3060 IF DI<.0201 OR DI>.1285 THEN INPUT WG
3061 IF DI<.0201 OR DI>.1285 THEN GOTO 3046
3065 LET LFR=492/FR
3067 REM OM = OMEGA PER KRAUS P. 235 EQN.(9-17)
3068 LET OM=2*LN (2*LFR*12/DI)
3100 PRINT "F";TAB 7;"X","R";TAB 25;"SWR"
3103 GOSUB 2000
3115 STOP
3116 REM  END OF PRINTOUT. SEE REMARK 2 ABOVE.
3200 PRINT AT 1,0;"GIVEN A WIRE DIPOLE RESONANT AT "
3202 PRINT AT 2,12;FR;" MHZ"
3208 PRINT AT 3,0;"MADE OF NR. ";WG;" WIRE. (8 TO 24)  - (EVEN NUMBER GAUGES ONL
Y)"
3214 PRINT AT 4,0;"TO FIND ITS IMPEDANCE AND THE      SWR OF A ";Z0;" OHM FEEDER
"
3216 GOTO 3020
```

EP-44 INTERFACE
Bob Howard WA6DLI

Here is the information necessary to interface the Brother EP-44 typewriter terminal to a Sinclair computer. This information will be exact for my set up which uses the CAI Serial I/O and it may be helpful for others.

For Sinclair type computers, the interface must provide two features: 1) Sinclair code to ASCII code conversion, and 2) Token expansion to full ASCII words.

My interface is the CAI I/O Board with Eproms for the stringy-Floppy wafer tape storage and Serial Printer. My last address for CAI was:

CAI Instruments. INC., Box 2032, Midland, MI 48640, (517) 687-7343

For the EP-44 I wired the DB-25 plug to the printer as shown in the CAI Manual:

```
in 20-------DSR-------1 (CAI Board)
in  4-------CTS-------2
out 6-------DTR-------4
in  2-------SDI-------5
out 3-------SDO-------6
out 5-------RTS-------8
    7----ground-------9
```

The baud rate and parity should be set as shown in the EP-44 Computer Applications Manual for Atari & Commodore, namely:

```
Baud rate   75
Bit Length   7
Parity       Z
New Line    <cr>
Code          8 bit
ER            Y
(Set EP-44 line space to 1)
```

The interface has to be set to 75 baud by typing the following into the computer and running it:

```
10  LET ACE = 14336  (MEMORY LOCATION IN ACE)
20  POKE  ACE+3,128     (SET BAUD)
30  POKE ACE,108     (LSW OF BAUD DIVISOR)
40 POKE ACE+1,10    (MSW  OF BAUD DIVISOR)
50   POKE  ACE+3,3      (SET WORD LENGTH TO 8)
60 POKE ACE+4,3     (SET RTS AND DTR)
```

The CAI Manual gives the USER calls for LLIST etc., so your own interface should do the same. The CAI book did not show anything below 110 baud so the little program above sets 75 baud, which worked better than 110.

QL (4)
Alex. F Burr K5XY

This month the focus of this column is on one of the four software packages which comes with the QL. These packages provide a comprehensive word-processing, planning, information handling, and graphics capability and are intergrated in style, structure, design, and in the sharing of information. The wordprocessor is called QUILL, the spreadsheet is called ABACUS, the database is called ARCHIVE, and the graphics program is called EASEL.

This month we will discuss ABACUS, the spreadsheet program. ABACUS eliminates the grappling with row and column co-ordinates and replication of formulae over rows and columns required by existing worksheets with two major innovations:

LABLES - ABACUS willl use the existing text as sufficient reference for whole rows or columns or individual cells, for example "sales" or "February".

ROW/COLUMN OPERATIONS - ABACUS will automatically apply the rules or formulae entered to whole rows, columns, or blocks of cells without recourse to any complex command structure. For example "Row = 100" will put 100 in each cell in the current row, or more powerfully, one can set up the row "profit" as "profit = sales - costs" and ABACUS will put in the formula to subtract the row "costs" from the row "sales".

ABACUS is an "intelligent" worksheet because it uses "everyday" lavels, because it always prompts with the most likely choice of paramaters required, and because it always informs and guides the user in the entry of data and in the decisions which must be made. The software is self-documented and includes comprehensive Help files which can be accessed at any time.

ABACUS is also hugely powerful with an emormous range of built-in functions for operation on text as

well as numbers. These commands include the joining of worksheets, the use of multiple windows, the variation of widths and justification of text, the use of different units including monetary, integer, percentage, decimal, and exponential form, and the ability to prompt the operator for the input of data as part of the worksheet. ABACUS is also significantly faster that other worksheets and utilizes memory in a more efficient manner, thus increasing its capacity.

Some of the more important features are listed below.

Data, text, and formulae entry is direct into cells or whole rows or columns with ranges automatically prompted by ABACUS.

Rows, colunms, and cells are referred to by user-defined names or variables automatically from text entries. For example the column January in a budget may be referred to as January or Jan. and the relevant cell as Jan. sales or jan.sa or sal.JA.

Size - 256 rows by 64 columns

Accuracy to 16 significant figures

Windows - horizontal or vertical with joint or individual scrolling

Input line editor with cursor motion, insert, delete, and recall of previous entry

Screen formats automatic switch-in software for 80, 64, or 40 column screens

Units - integer, decimal, exponent, percentage, monetary with arbitrary symbols, positive and negative numbers or brackets for accounting

Consolidation joining or merging of two or more spreadsheets

Ordering or sorting of columns or rows

Variable grid with variable column widths and insertion and deletion of rows ans columns

Justification left, right , or center of text and numbers

Prompting for user with information and suggestions and not just menus. Automatic choice and prompting of parameter commands

Transmission of files through export andd import of mail to other QL applications software

Comprehensive numeric functions including full trigonometric functions, average, maximum, minimum, internal rate of return, net present value, angles, date, and time

Comprehensive text functions including logical if, ASCII code to character and character to code, string concatenation, lower and upper case conversion, and repeat function

Input functions on execute to prompt the user with data or text queries for repeated use

Help Key for user information.

Many of you will recognize that some of these functions are not available in sophisticated spreadsheets like Supercalc and few of them are available in such progams as VU-Calc. Let us hope that Sinclair will deliver the speed promised and that some desirable feature has not been left out.

PUBLISHER'S NOTES

QZX has made another step into the computer age. Several of you have contacted us on Bo's Bulletin Board (BB) at (505) 646-5194. We will be puting some of the articles in the BB before they get printed. If you have cheap long distance rates, you might want to try to get part of your next QZX a little early. This feature is still in the experimental stage so don't expect perfection. (Because you sure won't get it, especially with my typing.)

I was just trying to get our finances a little staightened out. Would you care to guess how much we have spent on postage so far? Over $3000.

AD1B sent us some statistics which he though you would be interested in.

MARKET SHARES
(worldwide 1984 estimates)
computers costing < $1000

Commodore 42%
Sinclair 18%
Atari 12%
Tandy 8%

Coleco 4%
Others 16%
(Sanyo will be on this list soon!.. Bo)

Bob Spurgeon sent us a nice letter declining to renew his subscription. He said "The Timex 1000 is actually the best unit one can acquire for math and physics". He said that he felt very let down that such a fine machine would be dropped. Nevertheless he said he was abandoning his T/S 1000 as he did not want to invest in software for a unit which could not be replaced if it went bad. (I bet QZX subscribers would come to his rescue if the 1000 dies. I suspect their mortality rate (the 1000, not our subscribers) is very low too... Bo) He has a point, but I am amazed at the amount of software still available and at the new software and hardware which is still coming on the market. A case in point is the letter we recently received from Research Service Labs, Box 19124, Oklahoma City, OK, 73144 which listed three fine hardware additions to the T/S line as well as a couple of interesting software packages. What is more interesting is the list of nine projects under development for the T/S computers.

BITS AND BYTES

45. K4FRY says that Timex told him that the cable between the computer and the TV set or monitor "is not of the shielded type. It contains, however, ferrite beads at either end, to contain radiated emissions below the specified FCC allowable limits." Norm goes on to say that they suggested that he make up his own lead of shielded coax to cure a hash problem he was gettin on his Drake R3 and Kenwood R599-D. (He cured the problem by getting a Icom R71-A).
46. KP4MD says that the T/S 1500 will normally load only 1000 baud tapes recorded with the Fastload monitor. Recordings can also be loaded at 1500 baud with the following hardware modification. A jumper wire is soldered across the 4.7 K resistor R22, and a 0.1 uf disc is paralleled across the 0.0047 uF capacitor C14. Normal 250 baud loads are not affected by this modification. It may be worth while trying the Z- Dubber after this modification.

QZX FRIENDS

KA2LHO -- Kraig is recovering from his accident in a cast and wheel chair but is still programming away. Look for more of his super programs in QZX.

KT5V -- Dave has been out of the country with school but is now trying to develop OSCAR applications for his T/S.

W1BYY got QZX another subscriber with a personal recommendation. Thanks.

Mike Witkowski got QZX a subscriber too (from France no less). Thanks.

K9UGX -- Jim wrote that he has five T/S 1000's and four keyboards along with three printers. He reported the non-delivery of an ordered keyboard from Ramex. The credit card company took the charge off is bill when he reported this fact.

W1MDZ -- Stan writes that he now has several ZX81's and T/S1000's. He also recommends his Gorilla-Banana printer and a green plastic filter to go with his used commercial monitor obtained for $40.

KE5IG -- Edwin says that he had added the A & J Microdrive to his T/S 1000. It has opened a whole new world for him in computing with the Timex.

PRINTER REVIEW
KRAIG D. PRITTS KA2LHO

Here is some information on the Brother EP-22 (not to be confused with the EP-44) typewriter-printer. I have enjoyed the use of this printer with my T/S 1000 for several months now and have very few complaints. I use the Momotech RS-232 interface and the Memotext work processor with it and everything seems to work out fine. I am writing this review using this setup. (Which was on colored paper which does not reproduce well; so is not shown here. The type face is dot matrix without descenders and with

both upper and lower case. ed.) I have not yet connected the EP-22 to my 2068 but there are several RS-232 interfaces advertised that could work with this equipment. I guess that I have only two complaints about the configuration and perhaps they could be solved with the right know how.

First of all the Memotext and the printer both have line feed signals at the end of the 75 character line and as a result I have not yet been able to achieve single spacing using this equipment. I am attempting to find out how to put in the printer a small switch to disable the automatic line feed mechanism. Secondly, it is difficult to print with less than a 75 character line because the Memotext does not throw a carriage return signal and the printer does not give one until the end of the line. It is possible to use narrow paper only by putting the paper along the right hand edge of the roller and setting your left margin to the left side of the paper. If any of you know how to solve these problems, I would certainly appreciate hearing for you on this.

Some very positive features are the small size and versatility - as I said in the review printed in a past issue. You can use plain smooth paper (bond and textured paper do not work well) or thermal paper. The paper for the T/S 2040 printer will work fine with the Brother if you have extra rolls and you are just experimenting and do not wish to use up the ribbon cassette.. The printer can run off of 4 D batteries thus making a portable computing station very feasible using this combination. You will need to configure a connecting cable between the Memotech cable and the printer. To do this you need to connect interface cable (IC) pin 2 to printer cable (PC) pin 3; PC pin 6 to PC pin 20; and IC pin 7 to PC pin 7. Connectors and ribbon wire can be picked up at any Radio Shack store for this cable.

Well, I hope that this will prove helpful to you and those readers wishing to know more about the Brother EP-22 typewriter/printer and its use with the Sinclair computer line.

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

FOR SALE: ZX81/TS1000 edgeboard wire-wrap connectors; keyed; bifurcated contacts; manufactured by TI; $5.00 each. PC piggy-back extender boards; $1.50 each. Economical experimenting with Radio-Shack's 276-158 and 161 project boards and these connectors. Add $0.75 shipping per order. Paul Hunter, 1630 Forest Hills Drive, Okemos, MI 48864.

FOR SALE: A few 8086 microprocessors at $15 each postpaid. Alex. F. Burr, 2025 O'Donnell, Las Cruces, NM 88001.

FOR SALE: IMPROVED Chebyshev/ Butterworth filter design program. Listing $1, cassette $5. C. Milazzo, USNS Box 3007, FPO Miami FL 34051.

FOR SALE: CWSS users: MLI speeds up your program and gives you a delete function. Don't XMIT your mistakes, DELETE them! MLI cassette and simple instructions- $7.50 ppd. John McGinley / 203 Milwaukee St / Mauston, WI 53948.

FOR SALE: ZX81 system of sale: ZX81 with 16K RAM, Suntronics full-stroke keyboard, TS 2040 printer, NU4V CWSS interface, back issues of QZX and SYNC, several books, lots of software, all cables, and power supplies.- $200. Call or write: Jon, N4KHI, 1340 Riverside Drive, Holly Hill, FL 32017 (904)672-6608 after 4PM.

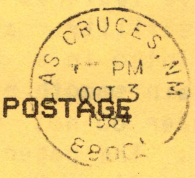
73, W4GHV & K5XY

QZX presents the best software & hardware projects available for the radio amateur. While the contents are believed to be accurate, no warranty is extended on any program or project. No investigation has been made of the claims or reputation of any advertiser. It would be greatly appreciated if all correspondance requiring an answer would be accompanied by a self-addressed stamped envelope (SASE). Copyright by QZX, 1984. All rights reserved, photocopying by permission only.

```
*****************************************
*Please send me QZX for 1 year, starting*
*immediately. Enclosed is $12.00 for    *
*first class mailing. (Those with add-  *
*resses not in Canada, the US, or Mexico*
*send $19.00 in US funds for air mail   *
*delivery.. Thanks  ( 9/84)             *
*                                       *
* Name _________________________________ *
* Call _____________                     *
*                                       *
* Address ______________________________ *
*                                       *
* City _________________________________ *
*                                       *
* State _______  ZIP __________          *
*****************************************
```

QZX Journal
2025 O'Donnell Drive
Las Cruces, N.M. 88001

FIRST CLASS POSTAGE



W*?MAT
KEN
RR 5 BOX 15 MATZNER 85/07
CHARLESTON
IL 61920